CLAIMS

What is claimed is:

1. A method of designing a roller cone drill bit, comprising:

(a) calculating force balance conditions of a bit;

(b) defining design variables;

(c) determining lower and upper bounds for the design variables;

(d) defining objective functions mathematically as a function of the design variables;

(e) defining constraint functions mathematically as a function of the design variables;

(f) performing an optimization means; and

(e) evaluating an optimized cutting structure by modeling.

2. The method of Claim 1, wherein the design variables include variables from a group consisting of journal angle, cone-profile angle, offset angle, tooth crest length, radial position of a center of the crest length, and tooth angles.

3. The method of Claim 1, wherein the objective functions are defined by:

$$Obj = (V_1-V_m)^2 + (V_2 -V_m)^2 + (V_3 -V_m)^2$$

wherein $V_m = (V_1 + V_2 + V_3)/3$ and V_1, V_2 and V_3 are volumes removed by cones 1, 2 and 3, respectively.

4. The method of Claim 1, wherein a lower bound of a tooth crest length is determined by tooth strength.